

PATENT**Docket No. 1232-4512**
S/N 09/256,411**LISTING OF CLAIMS:**

Claims 1-14, 16-18, 20, 21, 23-25 and 27-29 are pending in this application.

Claims 1, 3, 5, 7, 9, 11, 16, 23, 28 and 29 are herein amended as shown below.

The following listing of claims will replace all prior versions and listings of claims in this application.

1. (Currently Amended) An image sensing method comprising:
 - the zooming step of performing zooming operation;
 - the focusing step of performing focusing operation during the zooming operation;
 - the shutter speed control step of controlling a timing of a charge storage time of an image sensing element; and
 - the control step of controlling to change a zoom speed and a focus speed for compensating a change of a focal position caused by the zooming operation and maintaining an in focus state in the zooming step in accordance with a shutter speed so that the focusing operation is able to follow an object during the zooming operation.

2. (Original) The method according to claim 1, wherein the control step comprises controlling to decrease the zoom speed in the zooming step when the shutter speed is not more than a predetermined value.

3. (Currently Amended) An image sensing apparatus comprising:
 - a zooming device adapted to perform zooming operation;
 - a focusing device adapted to perform focusing operation;
 - a shutter speed control device adapted to control a timing of a charge storage time of an image sensing element; and

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a control device adapted to control to change a zoom speed of said zooming device and a focus speed of said focusing device for compensating a change of a focal position caused by the zooming operation and maintaining an in-focus state in accordance with a shutter speed so that the focusing operation is able to follow an object during the zooming operation.

4. (Previously Presented) The apparatus according to claim 3, wherein said control device controls to decrease the zoom speed of said zooming device when the shutter speed is not more than a predetermined value.

5. (Currently Amended) An image sensing method comprising:

the zooming step of performing zooming operation using a zoom lens;

the focus adjustment step of correcting movement of a focal plane upon movement of said zoom lens by using a focus lens;

the driving step of independently moving said zoom lens and said focus lens parallel to an optical axis;

the selection step of selecting a charge storage time of an image sensing element;

the shutter speed control step of controlling a timing of the charge storage time of said image sensing element; and

the control step of controlling to change a zoom speed and a focus speed for compensating a change of the focal plane caused by the zooming operation and maintaining an in-focus state in the zooming step in accordance with a shutter speed so that the focal plane can track an object in the focus adjustment step during the zooming operation.

6. (Original) The method according to claim 5, wherein the control step comprises controlling to decrease the zoom speed in the zooming step when the shutter speed is not more than a predetermined value.

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7. (Currently Amended) An image sensing apparatus comprising:
a zooming device adapted to perform zooming operation using a zoom lens;
a focus adjustment device adapted to correct movement of a focal plane upon
movement of said zoom lens by using a focus lens;
a driving device adapted to independently move said zoom lens and said focus
lens parallel to an optical axis;
an image sensing element;
a selection device adapted to select a charge storage time of said image sensing
element;
a shutter speed control device adapted to control a timing of the charge storage
time of said image sensing element; and
a control device adapted to control to change a ~~zoom speed~~ of said zooming
device and a focus speed of said focus adjustment device for compensating a change of the focal
plane caused by the zooming operation and maintaining an in-focus state in accordance with a
shutter speed so that the focus adjustment device can correct movement of the focal plane
following the movement of said zoom lens during the zooming operation.

8. (Previously Presented) The apparatus according to claim 7, wherein said
control device controls to decrease the zoom speed of said zooming device when the shutter
speed is not more than a predetermined value.

9. (Currently Amended) A storage medium storing a control program for
controlling an image sensing apparatus including a zooming device adapted to perform a
zooming operation, a focusing device adapted to perform a focusing operation, a shutter speed
control device adapted to control a timing of a charge storage time of an image sensing element,

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and a control device adapted to control a zoom speed of said zooming device and a focus speed of said focusing device for compensating a change of a focal position caused by the zooming operation and maintaining an in-focus state, wherein the control program has a control module for the step of controlling to change the zoom speed of said zooming device and the focus speed of said focusing device in accordance with a shutter speed so that the focusing operation is able to follow an object during the zooming operation.

10. (Previously Presented) The storage medium according to claim 9, wherein the control program has a control module for the control step of controlling to decrease the zoom speed of said zooming device when the shutter speed is not more than a predetermined value.

11. (Currently Amended) A storage medium storing a control program for controlling an image sensing apparatus comprising a zooming device adapted to perform zooming operation using a zoom lens, a focus adjustment device adapted to correct movement of a focal plane upon movement of said zoom lens by using a focus lens, a driving device adapted to independently move said zoom lens and said focus lens parallel to an optical axis, an image sensing element, a selection device adapted to

select a charge storage time of said image sensing element, a shutter speed control device adapted to control a timing of the charge storage time of said image sensing element, and a control device adapted to control a zoom speed of said zooming device and a focus speed of said focus adjustment device for compensating a change of the focal plane caused by the zooming operation and maintaining an in-focus state, wherein the control program has a control module for the step of controlling to change the zoom speed of said zooming device focus speed of said focus adjustment device in accordance with a shutter speed so that the focus adjustment

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device can correct movement of the focal plane following the movement of said zoom lens during the zooming operation.

12. (Previously Presented) The storage medium according to claim 11, wherein the control program has a control module for the control step of controlling to decrease the zoom speed of said zooming device when the shutter speed is not more than a predetermined value.

13. (Previously Presented) An image sensing apparatus having an arrangement which can maintain an in-focus state by correcting a displacement of a focal plane during zooming operation, comprising:

a signal detection device adapted to extract a high-frequency component from a video signal obtained by photographing an object, and detecting a sharpness signal;

a zoom speed detection device adapted to detect a speed of the zooming operation; and

an evaluation value calculation device adapted to change a time during which the sharpness signals are averaged in accordance with the speed of the zooming operation, during the zooming operation, and calculating a focus evaluation value during the zooming operation in the set averaging time.

wherein said evaluation value calculation device includes an averaging time table set in correspondence with various zoom speeds, determines the various zoom speeds by referring to the averaging time, and calculates the focus evaluation value.

14. (Previously Presented) The apparatus according to claim 13, wherein said evaluation value calculation device calculates the focus evaluation value in accordance with the speed of the zooming operation by shortening the averaging time of the sharpness signals when

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the zoom speed is high, and prolonging the averaging time of the sharpness signals when the zoom speed is low.

15. (Canceled)

16. (Currently Amended) An image sensing apparatus having an arrangement which can maintain an in-focus state by correcting a displacement of a focal plane during zooming operation, comprising:

a signal detection device adapted to extract a high-frequency component from a video signal obtained by photographing an object, and detecting a sharpness signal;

a signal extraction device adapted to extract a luminance signal from the video signal obtained by photographing the object; and

an evaluation value calculation device adapted to change in response to the zooming operation a time during which the sharpness signals are averaged in accordance with an object illuminance obtained from the luminance signal, during the zooming operation, and calculating a focus evaluation value during the zooming operation in the set averaging time.

17. (Previously Presented) The apparatus according to claim 16, wherein said evaluation value calculation device calculates the focus evaluation value in accordance with the object illuminance by shortening the averaging time of the sharpness signals when the object illuminance is high, and prolonging the averaging time of the sharpness signals when the object illuminance is low.

18. (Previously Presented) An image sensing apparatus having an arrangement which can maintain an in-focus state by correcting a displacement of a focal plane during zooming operation, comprising:

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a signal detection device adapted to extract a high-frequency component from a video signal obtained by photographing an object, and detecting a sharpness signal;

a shake detection device adapted to detect a shake of said image sensing apparatus; and

an evaluation value calculation device adapted to change a time during which the sharpness signals are averaged in accordance with information from said shake detection device, during the zooming operation, and calculating a focus evaluation value during the zooming operation in the set averaging time.

wherein said evaluation value calculation device calculates the focus evaluation value by shortening the averaging time of the sharpness signals when no shake is detected by said shake detection device, and prolonging the averaging time of the sharpness signals when a shake is detected.

19. (Canceled)

20. (Previously Presented) An image sensing apparatus comprising:
a first lens group for zooming operation;
a second lens group for correcting movement of a focal plane during movement of said first lens group;

a signal detection device adapted to extract a high-frequency component from a video signal obtained by photographing an object, and detecting a sharpness signal;

a zoom speed detection device adapted to detect a speed of the zooming operation;

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a storage device adapted to store information of a focus position of said second lens group relative to a position of said first lens group in correspondence with an object distance;

a moving speed calculation device adapted to obtain a standard moving speed of said second lens group upon movement of said first lens group on the basis of the information stored in said storage device;

a speed addition device adapted to add a correction speed to the standard moving speed of said second lens group, obtained by said moving speed calculation device, during the zooming operation; and

a focus control device adapted to change a time during which the sharpness signals are averaged in accordance with the speed of the zooming operation, during the zooming operation, calculating a focus evaluation value during the zooming operation in the set averaging time, and changing the correction speed to be added to the standard moving speed in accordance with a magnitude of the calculated focus evaluation value.

wherein said evaluation value calculation device includes an averaging time table set in correspondence with various zoom speeds, determines the various zoom speeds by referring to the averaging time, and calculates the focus evaluation value.

21. (Previously Presented) The apparatus according to claim 20, wherein said focus control device calculates the focus evaluation value in accordance with the speed of the zooming operation by shortening the averaging time of the sharpness signals when the zoom speed is high, and prolonging the averaging time of the sharpness signals when the zoom speed is low.

22. (Canceled)

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23. (Currently Amended) An image sensing apparatus comprising:

a first lens group for zooming operation;

a second lens group for correcting movement of a focal plane during movement of said first lens group;

a signal detection device adapted to extract a high-frequency component from a video signal obtained by photographing an object, and detecting a sharpness signal;

a signal extraction device adapted to extract a luminance signal from the video signal obtained by photographing the object;

a storage device adapted to store information of a focus position of said second lens group relative to a position of said first lens group in correspondence with an object distance;

a moving speed calculation device adapted to obtain a standard moving speed of said second lens group upon movement of said first lens group on the basis of the information stored in said storage device;

a speed addition device adapted to add a correction speed to the standard moving speed of said second lens group, obtained by said moving speed calculation device, during the zooming operation; and

a focus control device adapted to change in response to the zooming operation a time during which the sharpness signals are averaged in accordance with an object illuminance obtained from the luminance signal, during the zooming operation, calculating a focus evaluation value during the zooming operation in the set averaging time, and changing the correction speed to be added to the standard moving speed in accordance with a magnitude of the calculated focus evaluation value.

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24. (Previously Presented) The apparatus according to claim 23, wherein said focus control device calculates the focus evaluation value in accordance with the object illuminance by shortening the averaging time of the sharpness signals when the object illuminance is high, and prolonging the averaging time of the sharpness signals when the object illuminance is low.

25. (Previously Presented) An image sensing apparatus comprising:

- a first lens group for zooming operation;
- a second lens group for correcting movement of a focal plane during movement of said first lens group;
- a signal detection device adapted to extract a high-frequency component from a video signal obtained by photographing an object, and detecting a sharpness signal;
- a shake detection device adapted to detect a shake of said image sensing apparatus;
- a storage device adapted to store information of a focus position of said second lens group relative to a position of said first lens group in correspondence with an object distance;
- a moving speed calculation device adapted to obtain a standard moving speed of said second lens group upon movement of said first lens group on the basis of the information stored in said storage device;
- a speed addition device adapted to add a correction speed to the standard moving speed of said second lens group, obtained by said moving speed calculation device, during the zooming operation; and

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a focus control device adapted to change a time during which the sharpness signals are averaged in accordance with information from said shake detection device, during the zooming operation, calculating a focus evaluation value during the zooming operation in the set averaging time, and changing the correction speed to be added to the standard moving speed in accordance with a magnitude of the calculated focus evaluation value.

wherein said evaluation value calculation device includes an averaging time table set in correspondence with various zoom speeds, determines the various zoom speeds by referring to the averaging time, and calculates the focus evaluation value.

26. (Canceled)

27. (Previously Presented) A lens control method used in an image sensing apparatus including a first lens group for zooming operation and a second lens group for correcting movement of a focal plane during movement of said first lens group and adapted to control movement of said second lens group so as to maintain an in-focus state by correcting a displacement of a focal plane upon movement of said first lens group during zooming operation, comprising the steps of:

creating an averaging sharpness signal generated by extracting a high-frequency component from a video signal obtained by photographing an object, and calculating a focus evaluation value for determining a moving speed of said second lens group on the basis of the averaged sharpness signal; and

changing the averaging time of the sharpness signal during the zooming operation in accordance with a speed of the zooming operation.

28. (Currently Amended) A lens control method used in an image sensing apparatus including a first lens group for zooming operation and a second lens group for

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correcting movement of a focal plane during movement of said first lens group and adapted to control movement of said second lens group so as to maintain an in-focus state by correcting a displacement of a focal plane upon movement of said first lens group during zooming operation, comprising the steps of:

creating an averaging sharpness signal generated by extracting a high-frequency component from a video signal obtained by photographing an object, and calculating a focus evaluation value for determining a moving speed of said second lens group on the basis of the averaged sharpness signal; and

changing the averaging time of the sharpness signal during the zooming operation in accordance with an object illuminance obtained from a luminance signal in the video signal obtained by photographing the object and a zooming speed of the zooming operation.

29. (Currently Amended) A lens control method used in an image sensing apparatus including a first lens group for zooming operation and a second lens group for correcting movement of a focal plane during movement of said first lens group and adapted to control movement of said second lens group so as to maintain an in-focus state by correcting a displacement of a focal plane upon movement of said first lens group during zooming operation, comprising the steps of:

creating an averaging sharpness signal generated by extracting a high-frequency component from a video signal obtained by photographing an object, and calculating a focus evaluation value for determining a moving speed of said second lens group on the basis of the averaged sharpness signal; and

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changing the averaging time of the sharpness signal during the zooming operation in accordance with information from a shake detection device adapted to detect a shake of said image sensing apparatus and a zooming speed of the zooming operation.